

Name (print): _____ Signature: _____

You have 30 minutes. Show your work. Notes, calculators not allowed! Problems are on both pages.

Problem 1. (6 pts) Find the derivatives:

$$\frac{d}{dx} (\ln(\tan(3x^7)))$$

$$\frac{d}{dz} \left((\arctan(7z))^4 \right)$$

Problem 2. (5 pts) Use linear approximation to approximate $\sqrt[3]{25}$.

Problem 3. (4 pts) Simplify $\tan(\arccos x)$ to an expression not involving trig functions.

Problem 4. (5 pts) Water is flowing at the rate of $50 \text{ m}^3/\text{min}$ from a shallow concrete conical reservoir (vertex down) of base radius 45 m and height 6 m. How fast is the water level falling when the water is 5 m deep?